

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Jonathan Gagneau Examiner #: 75637 Date: 11-1-04
 Art Unit: 1746 Phone Number X 272-1299 Serial Number: 10/050,926
 Mail Box and Bldg/Room Location: G.C.11 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: _____

Inventors (please provide full names): _____

Earliest Priority Filing Date: _____

**For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

Please see attached.

(NOT MUCH OUT THERE CLOSE)

STAFF USE ONLY

Type of Search

Vendors and cost where applicable

| | | |
|------------------------------------|-----------------------|------------------------|
| Searcher: <u>Est</u> | NA Sequence (#) _____ | STN _____ |
| Searcher Phone #: _____ | AA Sequence (#) _____ | Dialog _____ |
| Searcher Location: _____ | Structure (#) _____ | Questel/Orbit _____ |
| Date Searcher Picked Up: _____ | Bibliographic _____ | Dr.Link _____ |
| Date Completed: <u>11-3-04</u> | Litigation _____ | Lexis/Nexis _____ |
| Searcher Prep & Review Time: _____ | Fulltext _____ | Sequence Systems _____ |
| Clerical Prep Time: _____ | Patent Family _____ | WWW/Internet _____ |
| Online Time: _____ | Other _____ | Other (specify) _____ |

- the appropriate serial number.
- ***For Foreign Patent Family Searches Only***
Include the country name and patent number.
- Provide examples or give us relevant citations, authors, etc., if known.
- FAX or send the **abstract, pertinent claims** (not all of the claims), **drawings, or chemical structures** to your EIC or branch library.

Enter your Search Topic Information below:

A battery electrode having any of the compositions defined in attached claims 1, 14, or 21.

Even though elements A and B are written in the formulas as "+A + bB," these are the critical parts of the formulas and should be searched as being an integral element in the compounds. →

(Author's citation) not actually indexed this way, so had to search it both ways to be safe.)

Special Instructions and Other Comments:

(For fastest service, let us know the best times to contact you, in case the searcher needs further clarification on your search.)

Press ALT + F, then P to print this screen for your own information.

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Last Modified: 08/20/2004 09:04:50

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NOV 1

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For all other search requests, fill out the form, print, and submit the printout with any attachments to the STIC facility serving your Technology Center.

Tech Center:

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Enter your Contact Information below:Name: Employee Number: Phone: Art Unit or Office: Building & Room Number: Enter the case serial number (Required):

If not related to a patent application, please enter NA here.

Class / Subclass(es) Earliest Priority Filing Date: **Format preferred for results:**☒ Paper ☐ Diskette ☐ E-mail**Provide detailed information on your search topic:**

- In your own words, describe in detail the concepts or subjects you want us to search.
- Include synonyms, keywords, and acronyms. Define terms that have special meanings.
- ***For Chemical Structure Searches Only***
Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers
- ***For Sequence Searches Only***
Include all pertinent information (parent, child, divisional, or issued patent numbers) along with

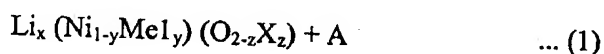
Amend

has typos

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A lithium ion secondary battery, comprising:
a positive electrode comprising an active material containing a composite oxide;
a negative electrode; and a nonaqueous electrolyte;
the composite oxide having a composition represented by a structural formula (1)
given below:



where MeI is at least one kind of an element selected from the group consisting of B, Mg, Al, Sc, Ti, V, Cr, Mn, Co, Cu, Zn, Ga, Y, Zr, Nb, Mo, Tc, Ru, Sn, La, Hf, Ta, W, Re, Pb and Bi, X is at least one kind of a halogen element selected from the group consisting of F, Cl, Br and I, the molar ratios x, y, z are $0.02 \leq x \leq 1.3$, $0.005 \leq y \leq 0.5$, and $0.01 \leq z \leq 0.5$, A contains Ca and at least one element selected from the group consisting of Na, K and S, and each of the Na content, the K content and the S content of the composite oxide falls within a range of between from 600 ppm and to 3,000 ppm, and the Ca content in said composite oxide is not higher than 500 ppm.

Claim 2 (Cancelled)

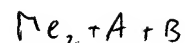
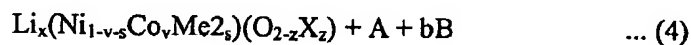
Claim 3 (Currently Amended): A lithium ion secondary battery according to claim 2 1, wherein said element A includes a combination of Ca, Na and S, a combination of Na and Ca or a combination of S and Ca.

$0.01 \leq z \leq 0.5$, A contains Ca and at least one element selected from the group consisting of Na, K and S, and each of the Na content, the K content and the S content of the composite oxide falls within a range of between from 600 ppm and to 3,000 ppm and the Ca content in said composite oxide falls within a range of from 20 ppm to 500 ppm.

Claim 12 (Cancelled).

Claim 13 (Original): A lithium ion secondary battery according to claim 11, wherein said element Me2 is at least one kind of an element selected from the group consisting of Ti, V, Cr, Zr, Nb, Mo, Hf, Ta and W.

Claim 14 (Currently Amended): A lithium ion secondary battery, comprising:
 a positive electrode comprising an active material containing a composite oxide;
 a negative electrode; and
 a nonaqueous electrolyte;
 the composite oxide having a composition represented by a structural formula (4)
 given below:



where Me2 is at least one kind of an element selected from the group consisting of B, Mg, Al, Sc, Ti, V, Cr, Mn, Cu, Zn, Ga, Y, Zr, Nb, Mo, Tc, Ru, Sn, La, Hf, Ta, W, Re, Pb and Bi, X is at least one kind of a halogen element selected from the group consisting of F, Cl, Br and I, the molar ratios x, v, s and z are $0.02 \leq x \leq 1.3$, $0.005 \leq v \leq 0.5$, $0.005 \leq s \leq 0.5$ and $0.01 \leq z \leq 0.5$, A contains Ca and at least one element selected from the group consisting of Na, K and S, each of the Na content, the K content and the S content of the composite oxide falls within a range of between from 600 ppm and to 3,000 ppm, the Ca content in said composite oxide is not higher than 500 ppm, B contains at least one element selected from the group consisting of Si and Fe, and the content b of said element B in said composite oxide falls within a range of between from 20 ppm and to 500 ppm.

Claim 15 (Cancelled).

Claim 16 (Original): A lithium ion secondary battery according to claim 14, wherein said element Me2 is at least one kind of an element selected from the group consisting of Ti, V, Cr, Zr, Nb, Mo, Hf, Ta and W.

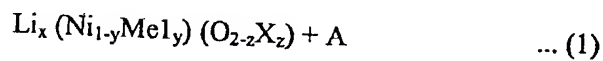
Claim 17 (Cancelled).

Claim 18 (Cancelled).

Claim 19 (Cancelled).

Claim 20 (Cancelled).

Claim (21). (New) A lithium ion secondary battery, comprising:
a positive electrode comprising an active material containing a composite oxide;
a negative electrode; and a nonaqueous electrolyte;
the composite oxide having a composition represented by a structural formula (1)
given below:



where Me1 is at least one kind of an element selected from the group consisting of B, Mg, Al, Sc, Ti, V, Cr, Mn, Co, Cu, Zn, Ga, Y, Zr, Nb, Mo, Tc, Ru, Sn, La, Hf, Ta, W, Re, Pb and Bi, X is at least one kind of a halogen element selected from the group consisting of F, Cl, Br and I, the molar ratios x, y, z are $0.02 \leq x \leq 1.3$, $0.005 \leq y \leq 0.5$, and $0.01 \leq z \leq 0.5$, A contains Na and S, and each of the Na content and the S content of the composite oxide falls within a range of from 600 ppm to 3,000 ppm.

was cancelled

22. (New) A lithium ion secondary battery according to claim 2, wherein said composite oxide further includes an element B containing at least one element selected from the group consisting of Se and Fe.

23. (New) A lithium ion secondary battery according to claim 22, wherein the content of said element B in said composite oxide falls within a range of from 20 ppm to 500 ppm.

24. (New) A lithium ion secondary battery according to claim 22, wherein the content of said element B in said composite oxide falls within a range of from 20 ppm to 250 ppm.

=> file reg

FILE 'REGISTRY' ENTERED AT 18:19:17 ON 03 NOV 2004
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FILE 'REGISTRY' ENTERED AT 18:03:29 ON 03 NOV 2004

| | |
|----|---|
| L1 | 339 S LI/ELS (L) NI/ELS (L) (B OR MG OR AL OR SC OR TI OR V O |
| L2 | 3 S L1 (L) CA/ELS (L) (NA OR K OR S)/ELS |
| L3 | 2 S L2 (L) CO/ELS (L) (SI OR FE)/ELS |
| L4 | 2 S L1 (L) NA/ELS (L) S/ELS |
| L5 | 1 S L4 NOT CA/ELS |

FILE 'CAOLD' ENTERED AT 18:15:51 ON 03 NOV 2004

| | |
|----|--------|
| L6 | 0 S L2 |
| L7 | 0 S L3 |
| L8 | 0 S L4 |
| L9 | 0 S L5 |

FILE 'ZCAPLUS' ENTERED AT 18:16:05 ON 03 NOV 2004

| | |
|-----|--------|
| L10 | 2 S L2 |
| L11 | 2 S L3 |
| L12 | 1 S L4 |
| L13 | 1 S L5 |

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*One invention
the same*

↓↓↓ claim 1

=> d l10 1-2 ibib abs hitstr hitrn

L10 ANSWER 1 OF 2 ZCAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2002:573503 ZCAPLUS

DOCUMENT NUMBER: 137:143014

TITLE: Secondary lithium ion battery, cathode active
mass, and magnesia-based sagger for firing
lithium mixed oxide

INVENTOR(S): Kanai, Hideyuki

PATENT ASSIGNEE(S): Toshiba Corp., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. ----- | KIND ---- | DATE ----- | APPLICATION NO. ----- | DATE |
|----------------------|--------------|-----------------|--------------------------|----------------------------|
| JP <u>2002216758</u> | A2 | <u>20020802</u> | <u>JP 2001-14890</u> | <u>200101</u> <u>23</u> |
| JP 3552210 | B2 | 20040811 | JP 2001-14890 | 200101 23 |

PRIORITY APPLN. INFO.:

AB The title battery is equipped with a cathode contg. a Li-contg. mixed oxide as cathode active mass, which is obtained by firing raw material powder in a sagger contg. MgO and/or MgAl₂O₄ spinel. The cathode active mass is also claimed. The sagger is also claimed. The cathode active mass has desired grain size distribution and the battery provides high safety by preventing ignition and long cycle life.

IT **444728-06-7P 444728-10-3P**
 (lithium mixed oxide fired in sagger contg. MgO or MgAl₂O₄ for cathode in lithium battery)

RN 444728-06-7 ZCAPLUS

CN Calcium cobalt lithium nickel sodium sulfur fluoride oxide (9CI)
 (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | x | 17778-80-2 |
| F | x | 14762-94-8 |
| S | x | 7704-34-9 |
| Ca | x | 7440-70-2 |
| Co | x | 7440-48-4 |
| Na | x | 7440-23-5 |
| Ni | x | 7440-02-0 |
| Li | x | 7439-93-2 |

RN 444728-10-3 ZCAPLUS

CN Calcium cobalt iron lithium nickel sodium fluoride oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | x | 17778-80-2 |
| F | x | 14762-94-8 |
| Ca | x | 7440-70-2 |
| Co | x | 7440-48-4 |
| Na | x | 7440-23-5 |
| Ni | x | 7440-02-0 |
| Li | x | 7439-93-2 |
| Fe | x | 7439-89-6 |

IT 444728-06-7P 444728-10-3P

(lithium mixed oxide fired in sagger contg. MgO or MgAl₂O₄ for cathode in lithium battery)

L10 ANSWER (2) OF 2 ZCAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2000:260192 ZCAPLUS

DOCUMENT NUMBER: 132:296710

TITLE: Manufacture of enameled steel sheets using a composition enabling to avoid fish-scale
Hemmen, Pascale; Cholet, Vincent; Vitter, Gerard
Sollac, Fr.

INVENTOR(S):
PATENT ASSIGNEE(S):
SOURCE: PCT Int. Appl., 25 pp.

DOCUMENT TYPE: CODEN: PIXXD2

LANGUAGE: Patent
French

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|--------------------------|----------|----------------------|-----------------|--------------|
| WO 2000021896 | A1 | 20000420 | WO 1999-FR2383 | 199910 06 |
| FR 2784696 | A1 | 20000421 | FR 1998-12912 | 199810 14 |
| FR 2784696 CA 2347142 | B1 AA | 20001110 20000420 | CA 1999-2347142 | 199910 06 |
| BR 9914517 | A | 20010626 | BR 1999-14517 | |

W: BR, CA, JP, KR, US

RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE

| | | | | |
|--|----|----------|----------------|--------------|
| EP 1140719 | A1 | 20011010 | EP 1999-970375 | 199910 06 |
| EP 1140719 | B1 | 20020904 | | 199910 06 |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI | | | | |
| JP 2002527614 | T2 | 20020827 | JP 2000-575807 | |
| AT 223357 | E | 20020915 | AT 1999-970375 | 199910 06 |
| PT 1140719 | T | 20021231 | PT 1999-970375 | 199910 06 |
| ES 2181503 | T3 | 20030216 | ES 1999-970375 | 199910 06 |
| PRIORITY APPLN. INFO.: | | | FR 1998-12912 | 199910 06 |
| | | | | A |
| | | | WO 1999-FR2383 | 199810 14 |
| | | | | W |
| | | | | 199910 06 |

AB The two-layer enamel for the manuf. of both sides enameled-resistant steel sheets comprises a vitreous phase contg. .gtoreq.1 dispersed crystal mineral 2-25 wt.% (e.g., 15 or 25% of .beta.-Ga₂O₃) having a protonic cond. >10⁻⁶ S.cntdot.cm⁻¹ at 3000. The mineral is dispersed in a proportion sufficient for providing the enamel with impermeability to hydrogen >10⁻¹¹ g.cntdot.cm⁻²s⁻¹ in the range of temps. between 3000 and the enamel glass transition temp. The dew point of the firing atm. is >50. The firing temp. is less than a low temp. limit of .alpha.-.gamma. transformation of the steel. The cooling rate of enameled steel sheets is >100/min between Ac₃ and the enamel glass transition temp. (Ac₃ is a top temp. limit of .alpha.-.gamma. transformation of the steel).

IT 264626-01-9

(enameling with; manuf. of enameled steel sheets using a compn. enabling to avoid fish-scale)

RN 264626-01-9 ZCAPLUS

CN Aluminum barium boron calcium cobalt lithium nickel phosphorus potassium silicon sodium zirconium fluoride oxide
(Al_{0.08}Ba_{0.01}B_{0.28}Ca_{0.08}Co_{0.01}Li_{0.04}Ni_{0.01}P_{0.01}K_{0.03}Si_{0.5}Na_{0.27}Zr_{0.01}F_{0.03}O_{1.84}) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.84 | 17778-80-2 |
| F | 0.03 | 14762-94-8 |
| P | 0.01 | 7723-14-0 |
| Ca | 0.08 | 7440-70-2 |
| Zr | 0.01 | 7440-67-7 |
| Co | 0.01 | 7440-48-4 |
| B | 0.28 | 7440-42-8 |
| Ba | 0.01 | 7440-39-3 |
| Na | 0.27 | 7440-23-5 |
| Si | 0.5 | 7440-21-3 |
| K | 0.03 | 7440-09-7 |
| Ni | 0.01 | 7440-02-0 |
| Li | 0.04 | 7439-93-2 |
| Al | 0.08 | 7429-90-5 |

IT 264626-01-9

(enameling with; manuf. of enameled steel sheets using a compn.
enabling to avoid fish-scale)REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR
THIS RECORD. ALL CITATIONS AVAILABLE IN
THE RE FORMAT

=> d l11 1-2 ibib abs hitstr hitrn

*same as before**claim 14*

L11 ANSWER 1 OF 2 ZCAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2002:573503 ZCAPLUS

DOCUMENT NUMBER: 137:143014

TITLE: Secondary lithium ion battery, cathode active
mass, and magnesia-based sagger for firing
lithium mixed oxide

INVENTOR(S): Kanai, Hideyuki

PATENT ASSIGNEE(S): Toshiba Corp., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---------------|------|----------|-----------------|------|
| JP 2002216758 | A2 | 20020802 | JP 2001-14890 | |

JP 3552210
PRIORITY APPLN. INFO.:

B2 20040811

JP 2001-14890

200101
23

200101
23

AB The title battery is equipped with a cathode contg. a Li-contg. mixed oxide as cathode active mass, which is obtained by firing raw material powder in a sagger contg. MgO and/or MgAl₂O₄ spinel. The cathode active mass is also claimed. The sagger is also claimed. The cathode active mass has desired grain size distribution and the battery provides high safety by preventing ignition and long cycle life.

IT 444728-10-3P

(lithium mixed oxide fired in sagger contg. MgO or MgAl₂O₄ for cathode in lithium battery)

RN 444728-10-3 ZCAPLUS

CN Calcium cobalt iron lithium nickel sodium fluoride oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | x | 17778-80-2 |
| F | x | 14762-94-8 |
| Ca | x | 7440-70-2 |
| Co | x | 7440-48-4 |
| Na | x | 7440-23-5 |
| Ni | x | 7440-02-0 |
| Li | x | 7439-93-2 |
| Fe | x | 7439-89-6 |

IT 444728-10-3P

(lithium mixed oxide fired in sagger contg. MgO or MgAl₂O₄ for cathode in lithium battery)

L11 ANSWER 2 OF 2 ZCAPLUS COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 2000:260192 ZCAPLUS
DOCUMENT NUMBER: 132:296710

TITLE: Manufacture of enameled steel sheets using a composition enabling to avoid fish-scale
INVENTOR(S): Hemmen, Pascale; Cholet, Vincent; Vitter, Gerard
PATENT ASSIGNEE(S): Sollac, Fr.
SOURCE: PCT Int. Appl., 25 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: French

same as before

FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

| PATENT NO. ----- | KIND --- | DATE ----- | APPLICATION NO. ----- | DATE |
|--|-------------|----------------------|--------------------------|--------------|
| WO 2000021896 | A1 | 20000420 | WO 1999-FR2383 | 199910 06 |
| W: BR, CA, JP, KR, US RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE | | | | |
| FR 2784696 | A1 | 20000421 | FR 1998-12912 | 199810 14 |
| FR 2784696 CA 2347142 | B1 AA | 20001110 20000420 | CA 1999-2347142 | 199910 06 |
| BR 9914517 | A | 20010626 | BR 1999-14517 | 199910 06 |
| EP 1140719 | A1 | 20011010 | EP 1999-970375 | 199910 06 |
| EP 1140719 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI | B1 | 20020904 | | 199910 06 |
| JP 2002527614 | T2 | 20020827 | JP 2000-575807 | 199910 06 |
| AT 223357 | E | 20020915 | AT 1999-970375 | 199910 06 |
| PT 1140719 | T | 20021231 | PT 1999-970375 | 199910 06 |
| ES 2181503 | T3 | 20030216 | ES 1999-970375 | 199910 06 |
| PRIORITY APPLN. INFO.: | | | | 199910 06 |
| | | | FR 1998-12912 | A |
| | | | | 199810 14 |
| | | | WO 1999-FR2383 | W |
| | | | | 199910 06 |

AB The two-layer enamel for the manuf. of both sides enameled-resistant steel sheets comprises a vitreous phase contg. .gtoreq.1 dispersed crystal mineral 2-25 wt.% (e.g., 15 or 25% of .beta.-Ga₂O₃) having a protonic cond. >10⁻⁶ S.cntdot.cm⁻¹ at 3000. The mineral is dispersed in a proportion sufficient for providing the enamel with impermeability to hydrogen >10⁻¹¹ g.cntdot.cm⁻²s⁻¹ in the range of temps. between 3000 and the enamel glass transition temp. The dew point of the firing atm. is >50. The firing temp. is less than a low temp. limit of .alpha.-.gamma. transformation of the steel. The cooling rate of enameled steel sheets is >100/min between Ac₃ and the enamel glass transition temp. (Ac₃ is a top temp. limit of .alpha.-.gamma. transformation of the steel).

IT 264626-01-9

(enameling with; manuf. of enameled steel sheets using a compn. enabling to avoid fish-scale)

RN 264626-01-9 ZCAPLUS

CN Aluminum barium boron calcium cobalt lithium nickel phosphorus potassium silicon sodium zirconium fluoride oxide
(Al_{0.08}Ba_{0.01}B_{0.28}Ca_{0.08}Co_{0.01}Li_{0.04}Ni_{0.01}P_{0.01}K_{0.03}Si_{0.5}Na_{0.27}Zr_{0.01}F_{0.03}O_{1.84}) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
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| F | 0.03 | 14762-94-8 |
| P | 0.01 | 7723-14-0 |
| Ca | 0.08 | 7440-70-2 |
| Zr | 0.01 | 7440-67-7 |
| Co | 0.01 | 7440-48-4 |
| B | 0.28 | 7440-42-8 |
| Ba | 0.01 | 7440-39-3 |
| Na | 0.27 | 7440-23-5 |
| Si | 0.5 | 7440-21-3 |
| K | 0.03 | 7440-09-7 |
| Ni | 0.01 | 7440-02-0 |
| Li | 0.04 | 7439-93-2 |
| Al | 0.08 | 7429-90-5 |

IT 264626-01-9

(enameling with; manuf. of enameled steel sheets using a compn. enabling to avoid fish-scale)

REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> d 112 1 ibib abs hitstr hitrn

↓↓↓ claim 21

Same as before

L12 ANSWER 1 OF 1 ZCAPLUS COPYRIGHT 2004 ACS on STN
 ACCESSION NUMBER: 2002:573503 ZCAPLUS
 DOCUMENT NUMBER: 137:143014
 TITLE: Secondary lithium ion battery, cathode active mass, and magnesia-based sagger for firing lithium mixed oxide
 INVENTOR(S): Kanai, Hideyuki
 PATENT ASSIGNEE(S): Toshiba Corp., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---------------|------|----------|-----------------|----------|
| JP 2002216758 | A2 | 20020802 | JP 2001-14890 | 20010123 |
| JP 3552210 | B2 | 20040811 | JP 2001-14890 | 20010123 |

PRIORITY APPLN. INFO.: JP 2001-14890

AB The title battery is equipped with a cathode contg. a Li-contg. mixed oxide as cathode active mass, which is obtained by firing raw material powder in a sagger contg. MgO and/or MgAl₂O₄ spinel. The cathode active mass is also claimed. The sagger is also claimed. The cathode active mass has desired grain size distribution and the battery provides high safety by preventing ignition and long cycle life.

IT 444728-06-7P 444728-09-0P
 (lithium mixed oxide fired in sagger contg. MgO or MgAl₂O₄ for cathode in lithium battery)

RN 444728-06-7 ZCAPLUS

CN Calcium cobalt lithium nickel sodium sulfur fluoride oxide (9CI)
 (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|---------------------------|
| O | x | 17778-80-2 |
| F | x | 14762-94-8 |
| S | x | 7704-34-9 |
| Ca | x | 7440-70-2 |

| | | | | |
|----|--|---|--|-----------|
| Co | | x | | 7440-48-4 |
| Na | | x | | 7440-23-5 |
| Ni | | x | | 7440-02-0 |
| Li | | x | | 7439-93-2 |

RN 444728-09-0 ZCAPLUS

CN Cobalt lithium nickel sodium sulfur fluoride oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | x | 17778-80-2 |
| F | x | 14762-94-8 |
| S | x | 7704-34-9 |
| Co | x | 7440-48-4 |
| Na | x | 7440-23-5 |
| Ni | x | 7440-02-0 |
| Li | x | 7439-93-2 |

IT 444728-06-7P 444728-09-0P

(lithium mixed oxide fired in sagger contg. MgO or MgAl₂O₄ for cathode in lithium battery)

=> d l13 1 ibib abs hitstr hitrn

L13 ANSWER (1) OF 1 ZCAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2002:573503 ZCAPLUS

DOCUMENT NUMBER: 137:143014

TITLE: Secondary lithium ion battery, cathode active mass, and magnesia-based sagger for firing lithium mixed oxide

INVENTOR(S): Kanai, Hideyuki

PATENT ASSIGNEE(S): Toshiba Corp., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|---------------|------|----------|-----------------|------|
| JP 2002216758 | A2 | 20020802 | JP 2001-14890 | |

200101

23

(dup)

JP 3552210
PRIORITY APPLN. INFO.:

B2 20040811

JP 2001-14890

200101
23

AB The title battery is equipped with a cathode contg. a Li-contg. mixed oxide as cathode active mass, which is obtained by firing raw material powder in a sagger contg. MgO and/or MgAl₂O₄ spinel. The cathode active mass is also claimed. The sagger is also claimed. The cathode active mass has desired grain size distribution and the battery provides high safety by preventing ignition and long cycle life.

IT 444728-09-0P

(lithium mixed oxide fired in sagger contg. MgO or MgAl₂O₄ for cathode in lithium battery)

RN 444728-09-0 ZCAPLUS

CN Cobalt lithium nickel sodium sulfur fluoride oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | x | 17778-80-2 |
| F | x | 14762-94-8 |
| S | x | 7704-34-9 |
| Co | x | 7440-48-4 |
| Na | x | 7440-23-5 |
| Ni | x | 7440-02-0 |
| Li | x | 7439-93-2 |

IT 444728-09-0P

(lithium mixed oxide fired in sagger contg. MgO or MgAl₂O₄ for cathode in lithium battery)

=> d his l14-

FILE 'HCAPLUS' ENTERED AT 18:23:37 ON 03 NOV 2004

L14 6764 S KANAI ?/AU
L15 6800 S KANDA ?/AU
L16 17907 S KUBO ?/AU
L17 6 S L14 AND L15 AND L16
SEL L17 1-4 RN

FILE 'REGISTRY' ENTERED AT 18:31:14 ON 03 NOV 2004

L18 163 S E1-E163
L19 134 S L1 AND L18
E CALCIUM/CN
L20 1 S E3
E SODIUM/CN
L21 1 S E3
E POTASSIUM/CN
L22 1 S E3
E SULFUR/CN
L23 1 S E3

FILE 'ZCAPLUS' ENTERED AT 18:39:02 ON 03 NOV 2004

L24 69 S L1
L25 347462 S L20
L26 208733 S L21
L27 203406 S L22
L28 129141 S L23
L29 1 S L24 AND L25
L30 1 S L29 AND (L26 OR L27 OR L28)

FILE 'REGISTRY' ENTERED AT 18:40:50 ON 03 NOV 2004

L31 155 S L1 (L) CO/ELS

FILE 'ZCAPLUS' ENTERED AT 18:41:11 ON 03 NOV 2004

L32 34 S L31
L33 1 S L32 AND L25
L34 1 S L33 AND (L26 OR L27 OR L28)

FILE 'ZCAPLUS' ENTERED AT 18:43:21 ON 03 NOV 2004

L35 1 S L24 AND (L26 AND L28)
L36 ① S L30 OR L34 OR L35

=> d l36 1 ibib abs hitstr hitrn

(ended up being inventors' own work)

L36 ANSWER 1 OF 1 ZCAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2002:552265 ZCAPLUS
 DOCUMENT NUMBER: 137:127521
 TITLE: Nickel-based and nickel-cobalt-based mixed
 oxide-halides as cathode-active materials for
 lithium-ion secondary batteries
 INVENTOR(S): Hideyuki, Kanai; Kanda, Motoya; Kubo, Koichi
 PATENT ASSIGNEE(S): Kabushiki Kaisha Toshiba, Japan
 SOURCE: Eur. Pat. Appl., 60 pp.
 CODEN: EPXXDW
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

| PATENT NO. ----- | KIND ---- | DATE ----- | APPLICATION NO. ----- | DATE |
|--|--------------|---------------|--------------------------|-------------------|
| EP 1225650 | A2 | 20020724 | EP 2002-250420 | 200201 22 |
| EP 1225650 | A3 | 20030827 | | |
| R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR | | | | |
| JP 2002304994 | A2 | 20021018 | JP 2002-12013 | 200201 21 |
| JP 3530174 | B2 | 20040524 | | |
| US 2002150820 | A1 | 20021017 | US 2002-50926 | 200201 22 |
| PRIORITY APPLN. INFO.: | | | JP 2001-14891 | A 200101 23 |

- AB Cathode active material for lithium ion secondary batteries contain
 a composite oxide having a compn. of structural formula (1):
 $\text{Lix}(\text{Ni}_{1-y}\text{My})(\text{O}_2-\text{zXz}) + \text{A}$, in which M is at least one kind of an
 element selected from the group consisting of B, Mg, Al, Sc, Ti, V,
 Cr, Mn, Co, Cu, Zn, Ga, Y, Zr, Nb, Mo, Tc, Ru, Sn, La, Hf, Ta, W,
 Re, Pb and Bi; X is a halogen (F, Cl, Br and I); $x = 0.02-1.3$, 0.005
 $\leq y \leq 0.5$, and $z = 0.01-0.5$; A contains at least one
 element selected from the group consisting of Na, K and S, and each
 of the Na, K, and S contents of the composite oxide is 600-3,000
 ppm. A related compn. is $\text{Lix}(\text{Ni}_{1-v}\text{sCovM's})(\text{O}_2-\text{zXz}) + \text{A}$, in which
 M', A, and X are as defined above; $x = 0.02-1.3$, $v = 0.005-0.05$, $s =$
 $0.005-0.5$, and $z = 0.01-0.05$.
 IT 7440-09-7D, Potassium, compds. 7440-23-5D, Sodium,
 compds. 7440-70-2D, Calcium, compds. 7704-34-9D,

Sulfur, compds. 443892-75-9, Lithium nickel borate fluoride oxide (Li1.1Ni0.88(BO3)0.02F0.10I1.84) 443892-76-0, Lithium magnesium nickel fluoride oxide (Li1.1Mg0.02Ni0.88F0.10I1.9) 443892-77-1, Aluminum lithium nickel fluoride oxide (Al0.02Li1.1Ni0.88F0.10I1.9) 443892-78-2, Lithium nickel scandium fluoride oxide (Li1.1Ni0.88Sc0.02F0.10I1.9) 443892-79-3, Lithium nickel vanadium fluoride oxide (Li1.1Ni0.88V0.02F0.10I1.9) 443892-80-6, Chromium lithium nickel fluoride oxide (Cr0.02Li1.1Ni0.88F0.10I1.9) 443892-81-7, Lithium manganese nickel fluoride oxide (Li1.1Mn0.02Ni0.88F0.10I1.9) 443892-82-8, Lithium nickel zinc fluoride oxide (Li1.1Ni0.88Zn0.02F0.10I1.9) 443892-83-9, Gallium lithium nickel chloride oxide (Ga0.02Li1.1Ni0.88Cl0.10I1.9) 443892-84-0, Lithium nickel vanadium chloride oxide (Li1.1Ni0.88V0.02Cl0.10I1.9) 443892-85-1, Lithium nickel zirconium chloride oxide (Li1.1Ni0.88Zr0.02Cl0.10I1.9) 443892-86-2, Lithium molybdenum nickel bromide oxide (Li1.1Mo0.02Ni0.88Br0.10I1.9) 443892-87-3, Lithium nickel technetium bromide oxide (Li1.1Ni0.8899Tc0.02Br0.10I1.9) 443892-88-4, Lithium nickel ruthenium bromide oxide (Li1.1Ni0.88Ru0.02Br0.10I1.9) 443892-89-5, Lithium nickel tin bromide oxide (Li1.1Ni0.88Sn0.02Br0.10I1.9) 443892-90-8, Hafnium lithium nickel iodide oxide (Hf0.02Li1.1Ni0.88I0.10I1.9) 443892-91-9, Lithium nickel tungsten iodide oxide (Li1.1Ni0.88W0.02I0.10I1.9) 443892-92-0, Lithium nickel rhenium iodide oxide (Li1.1Ni0.88Re0.02I0.10I1.9) 443892-93-1, Bismuth lithium nickel iodide oxide (Bi0.02Li1.1Ni0.88I0.10I1.9) 443892-94-2, Lithium nickel titanium fluoride oxide (Li1.1Ni0.88Ti0.02F0.10I1.9) 443892-95-3, Lithium nickel niobium chloride oxide (Li1.1Ni0.88Nb0.02Cl0.10I1.9) 443892-96-4, Copper lithium nickel chloride oxide (Cu0.02Li1.1Ni0.88Cl0.10I1.9) 443892-97-5, Lithium nickel tantalum iodide oxide (Li1.1Ni0.88Ta0.02I0.10I1.9) 443893-00-3, Lanthanum lithium nickel fluoride oxide (La0.02Li1.1Ni0.88F0.10I1.9) 443893-01-4, Cobalt lithium nickel fluoride oxide (Co0.02Li1.1Ni0.88F0.10I1.9) 443893-02-5 443893-03-6 443893-04-7 443893-05-8 443893-06-9 443893-07-0 443893-08-1 443893-09-2 443893-10-5 443893-11-6 443893-12-7 443893-13-8, Cobalt lithium nickel tin bromide oxide (Co0.18Li1.1Ni0.7Sn0.02Br0.10I1.9) 443893-14-9 443893-15-0 443893-16-1, Cobalt lead lithium nickel iodide oxide (Co0.18Pb0.02Li1.1Ni0.7I0.10I1.9) 443893-17-2 443893-18-3 443893-19-4 443893-20-7 443893-21-8 443893-22-9 443893-23-0 443893-24-1 443893-25-2

443893-26-3

(cathode material; nickel-based and nickel-cobalt-based mixed oxide-halides as cathode-active materials for lithium-ion secondary batteries)

RN 7440-09-7 ZCAPLUS
CN Potassium (8CI, 9CI) (CA INDEX NAME)

K

RN 7440-23-5 ZCAPLUS
CN Sodium (8CI, 9CI) (CA INDEX NAME)

Na

RN 7440-70-2 ZCAPLUS
CN Calcium (8CI, 9CI) (CA INDEX NAME)

Ca

RN 7704-34-9 ZCAPLUS
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

RN 443892-75-9 ZCAPLUS
CN Lithium nickel borate fluoride oxide ($\text{Li}_{1.1}\text{Ni}_{0.88}(\text{BO}_3)_0.02\text{F}_{0.10}\text{I}_{1.84}$) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.84 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| BO3 | 0.02 | 14213-97-9 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-76-0 ZCAPLUS
CN Lithium magnesium nickel fluoride oxide ($\text{Li}_{1.1}\text{Mg}_{0.02}\text{Ni}_{0.88}\text{F}_{0.10}\text{I}_{1.9}$) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Ni | 0.88 | 7440-02-0 |
| Mg | 0.02 | 7439-95-4 |
| Li | 1.1 | 7439-93-2 |

RN 443892-77-1 ZCAPLUS

CN Aluminum lithium nickel fluoride oxide (Al0.02Li1.1Ni0.88F0.10I.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |
| Al | 0.02 | 7429-90-5 |

RN 443892-78-2 ZCAPLUS

CN Lithium nickel scandium fluoride oxide (Li1.1Ni0.88Sc0.02F0.10I.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Sc | 0.02 | 7440-20-2 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-79-3 ZCAPLUS

CN Lithium nickel vanadium fluoride oxide (Li1.1Ni0.88V0.02F0.10I.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| V | 0.02 | 7440-62-2 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-80-6 ZCAPLUS

CN Chromium lithium nickel fluoride oxide (Cr0.02Li1.1Ni0.88F0.10I.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Cr | 0.02 | 7440-47-3 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-81-7 ZCAPLUS

CN Lithium manganese nickel fluoride oxide (Li1.1Mn0.02Ni0.88F0.10I.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Ni | 0.88 | 7440-02-0 |
| Mn | 0.02 | 7439-96-5 |
| Li | 1.1 | 7439-93-2 |

RN 443892-82-8 ZCAPLUS

CN Lithium nickel zinc fluoride oxide (Li1.1Ni0.88Zn0.02F0.10I.9) (9CI)
(CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Zn | 0.02 | 7440-66-6 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-83-9 ZCAPLUS

CN Gallium lithium nickel chloride oxide (Ga0.02Li1.1Ni0.88Cl0.10I.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| Cl | 0.1 | 22537-15-1 |

| | | | | |
|----|--|------|--|------------|
| O | | 1.9 | | 17778-80-2 |
| Ga | | 0.02 | | 7440-55-3 |
| Ni | | 0.88 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443892-84-0 ZCAPLUS

CN Lithium nickel vanadium chloride oxide (Li1.1Ni0.88V0.02Cl0.10I.9)
(9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|---|-------|---|------------------------------|
| ===== | + | ===== | + | ===== |
| Cl | | 0.1 | | 22537-15-1 |
| O | | 1.9 | | 17778-80-2 |
| V | | 0.02 | | 7440-62-2 |
| Ni | | 0.88 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443892-85-1 ZCAPLUS

CN Lithium nickel zirconium chloride oxide (Li1.1Ni0.88Zr0.02Cl0.10I.9)
(9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|---|-------|---|------------------------------|
| ===== | + | ===== | + | ===== |
| Cl | | 0.1 | | 22537-15-1 |
| O | | 1.9 | | 17778-80-2 |
| Zr | | 0.02 | | 7440-67-7 |
| Ni | | 0.88 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443892-86-2 ZCAPLUS

CN Lithium molybdenum nickel bromide oxide (Li1.1Mo0.02Ni0.88Br0.10I.9)
(9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|---|-------|---|------------------------------|
| ===== | + | ===== | + | ===== |
| O | | 1.9 | | 17778-80-2 |
| Br | | 0.1 | | 10097-32-2 |
| Ni | | 0.88 | | 7440-02-0 |
| Mo | | 0.02 | | 7439-98-7 |
| Li | | 1.1 | | 7439-93-2 |

RN 443892-87-3 ZCAPLUS

CN Lithium nickel technetium bromide oxide
(Li1.1Ni0.8899Tc0.02Br0.10I.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| Tc | 0.02 | 14133-76-7 |
| Br | 0.1 | 10097-32-2 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-88-4 ZCAPLUS

CN Lithium nickel ruthenium bromide oxide (Li1.1Ni0.88Ru0.02Br0.10I1.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| Br | 0.1 | 10097-32-2 |
| Ru | 0.02 | 7440-18-8 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-89-5 ZCAPLUS

CN Lithium nickel tin bromide oxide (Li1.1Ni0.88Sn0.02Br0.10I1.9) (9CI)
(CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| Br | 0.1 | 10097-32-2 |
| Sn | 0.02 | 7440-31-5 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-90-8 ZCAPLUS

CN Hafnium lithium nickel iodide oxide (Hf0.02Li1.1Ni0.88I0.10I1.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| I | 0.1 | 14362-44-8 |
| Hf | 0.02 | 7440-58-6 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-91-9 ZCAPLUS

CN Lithium nickel tungsten iodide oxide (Li1.1Ni0.88W0.02I0.10I1.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| I | 0.1 | 14362-44-8 |
| W | 0.02 | 7440-33-7 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-92-0 ZCAPLUS

CN Lithium nickel rhenium iodide oxide (Li1.1Ni0.88Re0.02I0.10I1.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| I | 0.1 | 14362-44-8 |
| Re | 0.02 | 7440-15-5 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-93-1 ZCAPLUS

CN Bismuth lithium nickel iodide oxide (Bi0.02Li1.1Ni0.88I0.10I1.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| I | 0.1 | 14362-44-8 |
| Bi | 0.02 | 7440-69-9 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443892-94-2 ZCAPLUS

CN Lithium nickel titanium fluoride oxide (Li1.1Ni0.88Ti0.02F0.10I1.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |

| | | | | |
|----|--|------|--|-----------|
| Ti | | 0.02 | | 7440-32-6 |
| Ni | | 0.88 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443892-95-3 ZCAPLUS

CN Lithium nickel niobium chloride oxide (Li1.1Ni0.88Nb0.02Cl0.1O1.9)
(9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|---|-------|---|------------------------------|
| ===== | + | ===== | + | ===== |
| Cl | | 0.1 | | 22537-15-1 |
| O | | 1.9 | | 17778-80-2 |
| Nb | | 0.02 | | 7440-03-1 |
| Ni | | 0.88 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443892-96-4 ZCAPLUS

CN Copper lithium nickel chloride oxide (Cu0.02Li1.1Ni0.88Cl0.1O1.9)
(9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|---|-------|---|------------------------------|
| ===== | + | ===== | + | ===== |
| Cl | | 0.1 | | 22537-15-1 |
| O | | 1.9 | | 17778-80-2 |
| Cu | | 0.02 | | 7440-50-8 |
| Ni | | 0.88 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443892-97-5 ZCAPLUS

CN Lithium nickel tantalum iodide oxide (Li1.1Ni0.88Ta0.02I0.1O1.9)
(9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|---|-------|---|------------------------------|
| ===== | + | ===== | + | ===== |
| O | | 1.9 | | 17778-80-2 |
| I | | 0.1 | | 14362-44-8 |
| Ta | | 0.02 | | 7440-25-7 |
| Ni | | 0.88 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-00-3 ZCAPLUS

CN Lanthanum lithium nickel fluoride oxide (La0.02Li1.1Ni0.88F0.1O1.9)
(9CI) (CA INDEX NAME)

| Component | | Ratio | | Component |
|-----------|--|-------|--|-----------|
|-----------|--|-------|--|-----------|

| | | Registry Number |
|----|------|-----------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |
| La | 0.02 | 7439-91-0 |

RN 443893-01-4 ZCAPLUS

CN Cobalt lithium nickel fluoride oxide (Co0.02Li1.1Ni0.88F0.1O1.9)
(9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Co | 0.02 | 7440-48-4 |
| Ni | 0.88 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443893-02-5 ZCAPLUS

CN Cobalt lithium nickel borate fluoride oxide
(Co0.18Li1.1Ni0.7(BO3)0.02F0.1O1.84) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.84 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| BO3 | 0.02 | 14213-97-9 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443893-03-6 ZCAPLUS

CN Cobalt lithium magnesium nickel fluoride oxide
(Co0.18Li1.1Mg0.02Ni0.7F0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Mg | 0.02 | 7439-95-4 |
| Li | 1.1 | 7439-93-2 |

RN 443893-04-7 ZCAPLUS

CN Aluminum cobalt lithium nickel fluoride oxide
(Al0.02Co0.18Li1.1Ni0.7F0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |
| Al | 0.02 | 7429-90-5 |

RN 443893-05-8 ZCAPLUS

CN Cobalt lithium nickel scandium fluoride oxide
(Co0.18Li1.1Ni0.7Sc0.02F0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Co | 0.18 | 7440-48-4 |
| Sc | 0.02 | 7440-20-2 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443893-06-9 ZCAPLUS

CN Cobalt lithium manganese nickel fluoride oxide
(Co0.18Li1.1Mn0.02Ni0.7F0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| F | 0.1 | 14762-94-8 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Mn | 0.02 | 7439-96-5 |
| Li | 1.1 | 7439-93-2 |

RN 443893-07-0 ZCAPLUS

CN Cobalt copper lithium nickel chloride oxide
(Co0.18Cu0.02Li1.1Ni0.7Cl0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component |
|-----------|-------|-----------|
|-----------|-------|-----------|

| | | Registry Number |
|----|------|-----------------|
| Cl | 0.1 | 22537-15-1 |
| O | 1.9 | 17778-80-2 |
| Cu | 0.02 | 7440-50-8 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443893-08-1 ZCAPLUS

CN Cobalt lithium nickel zinc chloride oxide
(Co0.18Li1.1Ni0.7Zn0.02Cl0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| Cl | 0.1 | 22537-15-1 |
| O | 1.9 | 17778-80-2 |
| Zn | 0.02 | 7440-66-6 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443893-09-2 ZCAPLUS

CN Cobalt gallium lithium nickel chloride oxide
(Co0.18Ga0.02Li1.1Ni0.7Cl0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| Cl | 0.1 | 22537-15-1 |
| O | 1.9 | 17778-80-2 |
| Ga | 0.02 | 7440-55-3 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443893-10-5 ZCAPLUS

CN Cobalt lithium nickel yttrium chloride oxide
(Co0.18Li1.1Ni0.7Y0.02Cl0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| Cl | 0.1 | 22537-15-1 |
| O | 1.9 | 17778-80-2 |
| Y | 0.02 | 7440-65-5 |
| Co | 0.18 | 7440-48-4 |

| | | | | |
|----|--|-----|--|-----------|
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-11-6 ZCAPLUS

CN Cobalt lithium nickel technetium bromide oxide
(Co0.18Li1.1Ni0.799Tc0.02Br0.101.9) (9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|--|-------|--|------------------------------|
| O | | 1.9 | | 17778-80-2 |
| Tc | | 0.02 | | 14133-76-7 |
| Br | | 0.1 | | 10097-32-2 |
| Co | | 0.18 | | 7440-48-4 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-12-7 ZCAPLUS

CN Cobalt lithium nickel ruthenium bromide oxide
(Co0.18Li1.1Ni0.7Ru0.02Br0.101.9) (9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|--|-------|--|------------------------------|
| O | | 1.9 | | 17778-80-2 |
| Br | | 0.1 | | 10097-32-2 |
| Co | | 0.18 | | 7440-48-4 |
| Ru | | 0.02 | | 7440-18-8 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-13-8 ZCAPLUS

CN Cobalt lithium nickel tin bromide oxide
(Co0.18Li1.1Ni0.7Sn0.02Br0.101.9) (9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|--|-------|--|------------------------------|
| O | | 1.9 | | 17778-80-2 |
| Br | | 0.1 | | 10097-32-2 |
| Co | | 0.18 | | 7440-48-4 |
| Sn | | 0.02 | | 7440-31-5 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-14-9 ZCAPLUS

CN Cobalt lanthanum lithium nickel iodide oxide
(Co0.18La0.02Li1.1Ni0.7I0.101.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| I | 0.1 | 14362-44-8 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |
| La | 0.02 | 7439-91-0 |

RN 443893-15-0 ZCAPLUS

CN Cobalt lithium nickel rhenium iodide oxide
(Co0.18Li1.1Ni0.7Re0.02I0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| I | 0.1 | 14362-44-8 |
| Co | 0.18 | 7440-48-4 |
| Re | 0.02 | 7440-15-5 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443893-16-1 ZCAPLUS

CN Cobalt lead lithium nickel iodide oxide
(Co0.18Pb0.02Li1.1Ni0.7I0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| I | 0.1 | 14362-44-8 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |
| Pb | 0.02 | 7439-92-1 |

RN 443893-17-2 ZCAPLUS

CN Bismuth cobalt lithium nickel iodide oxide
(Bi0.02Co0.18Li1.1Ni0.7I0.1O1.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| I | 0.1 | 14362-44-8 |

| | | | | |
|----|--|------|--|-----------|
| Bi | | 0.02 | | 7440-69-9 |
| Co | | 0.18 | | 7440-48-4 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-18-3 ZCAPLUS

CN Cobalt lithium nickel titanium fluoride oxide
(Co0.18Li1.1Ni0.7Ti0.02F0.101.9) (9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|--|-------|--|------------------------------|
| ===== | | | | |
| O | | 1.9 | | 17778-80-2 |
| F | | 0.1 | | 14762-94-8 |
| Co | | 0.18 | | 7440-48-4 |
| Ti | | 0.02 | | 7440-32-6 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-19-4 ZCAPLUS

CN Cobalt lithium nickel vanadium fluoride oxide
(Co0.18Li1.1Ni0.7V0.02F0.101.9) (9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|--|-------|--|------------------------------|
| ===== | | | | |
| O | | 1.9 | | 17778-80-2 |
| F | | 0.1 | | 14762-94-8 |
| V | | 0.02 | | 7440-62-2 |
| Co | | 0.18 | | 7440-48-4 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-20-7 ZCAPLUS

CN Chromium cobalt lithium nickel fluoride oxide
(Cr0.02Co0.18Li1.1Ni0.7F0.101.9) (9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|--|-------|--|------------------------------|
| ===== | | | | |
| O | | 1.9 | | 17778-80-2 |
| F | | 0.1 | | 14762-94-8 |
| Co | | 0.18 | | 7440-48-4 |
| Cr | | 0.02 | | 7440-47-3 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-21-8 ZCAPLUS

CN Cobalt lithium nickel zirconium chloride oxide
(Co0.18Li1.1Ni0.7Zr0.02Cl0.101.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| Cl | 0.1 | 22537-15-1 |
| O | 1.9 | 17778-80-2 |
| Zr | 0.02 | 7440-67-7 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443893-22-9 ZCAPLUS

CN Cobalt lithium nickel niobium chloride oxide
(Co0.18Li1.1Ni0.7Nb0.02Cl0.101.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| Cl | 0.1 | 22537-15-1 |
| O | 1.9 | 17778-80-2 |
| Co | 0.18 | 7440-48-4 |
| Nb | 0.02 | 7440-03-1 |
| Ni | 0.7 | 7440-02-0 |
| Li | 1.1 | 7439-93-2 |

RN 443893-23-0 ZCAPLUS

CN Cobalt lithium molybdenum nickel bromide oxide
(Co0.18Li1.1Mo0.02Ni0.7Br0.101.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| O | 1.9 | 17778-80-2 |
| Br | 0.1 | 10097-32-2 |
| Co | 0.18 | 7440-48-4 |
| Ni | 0.7 | 7440-02-0 |
| Mo | 0.02 | 7439-98-7 |
| Li | 1.1 | 7439-93-2 |

RN 443893-24-1 ZCAPLUS

CN Cobalt hafnium lithium nickel bromide oxide
(Co0.18Hf0.02Li1.1Ni0.7Br0.101.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|-----------|-------|------------------------------|
| | | |

| | | | | |
|----|--|------|--|------------|
| O | | 1.9 | | 17778-80-2 |
| Br | | 0.1 | | 10097-32-2 |
| Hf | | 0.02 | | 7440-58-6 |
| Co | | 0.18 | | 7440-48-4 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-25-2 ZCAPLUS

CN Cobalt lithium nickel tantalum iodide oxide
(Co0.18Li1.1Ni0.7Ta0.02I0.10I1.9) (9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|--|-------|--|------------------------------|
| ===== | | | | |
| O | | 1.9 | | 17778-80-2 |
| I | | 0.1 | | 14362-44-8 |
| Co | | 0.18 | | 7440-48-4 |
| Ta | | 0.02 | | 7440-25-7 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

RN 443893-26-3 ZCAPLUS

CN Cobalt lithium nickel tungsten iodide oxide
(Co0.18Li1.1Ni0.7W0.02I0.10I1.9) (9CI) (CA INDEX NAME)

| Component | | Ratio | | Component Registry Number |
|-----------|--|-------|--|------------------------------|
| ===== | | | | |
| O | | 1.9 | | 17778-80-2 |
| I | | 0.1 | | 14362-44-8 |
| Co | | 0.18 | | 7440-48-4 |
| W | | 0.02 | | 7440-33-7 |
| Ni | | 0.7 | | 7440-02-0 |
| Li | | 1.1 | | 7439-93-2 |

IT 7440-09-7D, Potassium, compds. 7440-23-5D, Sodium, compds. 7440-70-2D, Calcium, compds. 7704-34-9D, Sulfur, compds. 443892-75-9, Lithium nickel borate fluoride oxide (Li1.1Ni0.88(BO3)0.02F0.10I1.84) 443892-76-0, Lithium magnesium nickel fluoride oxide (Li1.1Mg0.02Ni0.88F0.10I1.9) 443892-77-1, Aluminum lithium nickel fluoride oxide (Al0.02Li1.1Ni0.88F0.10I1.9) 443892-78-2, Lithium nickel scandium fluoride oxide (Li1.1Ni0.88Sc0.02F0.10I1.9) 443892-79-3, Lithium nickel vanadium fluoride oxide (Li1.1Ni0.88V0.02F0.10I1.9) 443892-80-6, Chromium lithium nickel fluoride oxide (Cr0.02Li1.1Ni0.88F0.10I1.9) 443892-81-7, Lithium manganese nickel fluoride oxide (Li1.1Mn0.02Ni0.88F0.10I1.9)

443892-82-8, Lithium nickel zinc fluoride oxide
(Li1.1Ni0.88Zn0.02F0.10I0.9) 443892-83-9, Gallium lithium
nickel chloride oxide (Ga0.02Li1.1Ni0.88Cl0.10I0.9)
443892-84-0, Lithium nickel vanadium chloride oxide
(Li1.1Ni0.88V0.02Cl0.10I0.9) 443892-85-1, Lithium nickel
zirconium chloride oxide (Li1.1Ni0.88Zr0.02Cl0.10I0.9)
443892-86-2, Lithium molybdenum nickel bromide oxide
(Li1.1Mo0.02Ni0.88Br0.10I0.9) 443892-87-3, Lithium nickel
technetium bromide oxide (Li1.1Ni0.8899Tc0.02Br0.10I0.9)
443892-88-4, Lithium nickel ruthenium bromide oxide
(Li1.1Ni0.88Ru0.02Br0.10I0.9) 443892-89-5, Lithium nickel
tin bromide oxide (Li1.1Ni0.88Sn0.02Br0.10I0.9) 443892-90-8
, Hafnium lithium nickel iodide oxide (Hf0.02Li1.1Ni0.88I0.10I0.9)
443892-91-9, Lithium nickel tungsten iodide oxide
(Li1.1Ni0.88W0.02I0.10I0.9) 443892-92-0, Lithium nickel
rhenium iodide oxide (Li1.1Ni0.88Re0.02I0.10I0.9) 443892-93-1
, Bismuth lithium nickel iodide oxide (Bi0.02Li1.1Ni0.88I0.10I0.9)
443892-94-2, Lithium nickel titanium fluoride oxide
(Li1.1Ni0.88Ti0.02F0.10I0.9) 443892-95-3, Lithium nickel
niobium chloride oxide (Li1.1Ni0.88Nb0.02Cl0.10I0.9)
443892-96-4, Copper lithium nickel chloride oxide
(Cu0.02Li1.1Ni0.88Cl0.10I0.9) 443892-97-5, Lithium nickel
tantalum iodide oxide (Li1.1Ni0.88Ta0.02I0.10I0.9)
443893-00-3, Lanthanum lithium nickel fluoride oxide
(La0.02Li1.1Ni0.88F0.10I0.9) 443893-01-4, Cobalt lithium
nickel fluoride oxide (Co0.02Li1.1Ni0.88F0.10I0.9)
443893-02-5 443893-03-6 443893-04-7
443893-05-8 443893-06-9 443893-07-0
443893-08-1 443893-09-2 443893-10-5
443893-11-6 443893-12-7 443893-13-8,
Cobalt lithium nickel tin bromide oxide
(Co0.18Li1.1Ni0.7Sn0.02Br0.10I0.9) 443893-14-9
443893-15-0 443893-16-1, Cobalt lead lithium
nickel iodide oxide (Co0.18Pb0.02Li1.1Ni0.7I0.10I0.9)
443893-17-2 443893-18-3 443893-19-4
443893-20-7 443893-21-8 443893-22-9
443893-23-0 443893-24-1 443893-25-2
443893-26-3

(cathode material; nickel-based and nickel-cobalt-based mixed
oxide-halides as cathode-active materials for lithium-ion
secondary batteries)